

Chattogram Veterinary and Animal Sciences University, Chattogram
Department of Fish Biology and Biotechnology
 MS in Fish Biology and Biotechnology; Jan- Jun Semester, Final Exam/21
Course No&Title.: RDA- 501 (T), Research Design and Genetic Data Analysis
 Total Marks-40, Time: 2 hours

Answer any five (05) from the followings. Figures in the right margin indicate full marks. Split answers are not acceptable.

1. a) What is an experiment? Why experimental design is important for biological research? 2.0
 b) Write the basic principles of an experimental design. 2.0
 b) Explain completely randomized block design with example. 4.0
2. a) What is regression co-efficient and paired sample T-test? Give examples of different types of data from the fisheries science. 4.0
 b) What do you mean by standard deviation and standard error? Why standard deviation and standard error is important for data interpretation? 4.0
3. a) What is ANOVA? Write the advantages of ANOVA. 2.0
 b) How will you compute one-way ANOVA? 6.0
4. a) What is phylogeny and phylogenetic tree? Illustrate the different parts of a phylogenetic tree. 3.0
 b) What is phylogenetic classification? Mention the general steps of phylogenetic tree construction. 3.0
 c) Mention the advantages and disadvantages of distance matrix method. 2.0
5. a) What is linkage disequilibrium? Explain the reasons of linkage disequilibrium? 4.0
 b) How is linkage disequilibrium and evolution interlinked? 4.0
6. a) What is Chi-Square test? How will you calculate Chi-Square (χ^2) statistic? 2.0
 b) What is goodness of fit test? Mention the advantages and limitations of Chi-square test? 2.0
 c) Coral fish have two forms of hemoglobin determined by alleles 'a' and 'b' at one locus. A sample of coral fish taken from the Bay of Bengal had the following frequencies of the three genotypes: aa= 138; ab= 763; bb= 1690; total= 2591. 4.0
 i) Are these frequencies compatible with the sample having been drawn from a random mating population?
 ii) What do they suggest about the breeding structure of the population?
7. a) Where will you use one way ANOVA? 1.0
 b) The following table shows the weight (g) of a fish species in four different situations (using four different feeding regimes, FR). Determine if the mean weight of the four groups significantly differs ($F_{3,36}=2.88$; at 5% level of significance). 7.0

Wt. (g) with FR1	Wt. (g) with FR2	Wt. (g) with FR3	Wt. (g) with FR4
130	122	134	108
128	128	129	112
124	125	133	113
126	127	131	113
130	133	133	116
130	125	136	108
125	128	127	112
132	120	129	110
122	129	132	114
123	119	135	112

Chattogram Veterinary and Animal Sciences University

Department of Fish Biology and Biotechnology

MS in Fish Biology and Biotechnology; Jan- Jun Semester, Final Exam/21

Course No & Title.: **PCG- 501 (T), Fish Population and Conservation Genetics**

Total Marks-40, Time: 2 hours

Answer any five (05) from the following. Figures in the right margins indicate full marks. Split answer is not acceptable.

1. a) Justify the importance of genetic management and conservation of fish population? 3.0
b) Discuss the measures you will consider to conserve exploited and endangered fishes? 5.0
2. a) What is Hardy Weinberg Equilibrium? Explain the factors responsible for causing deviation of gene and genotype frequencies from HWE. 4.0
b) Explain the HWE law with an example from fish. 4.0
2. a) What is genetic marker? How will you use molecular markers in genetic study and conservation of fish population? 3.0
b) Explain the principle of RFLP. Write the advantages and disadvantages of RFLP marker. 5.0
3. a) What is DNA barcoding? Mention the genes designated as barcode regions. 2.0
b) Discuss the process of DNA barcoding to identify new species. Mention its applications. 6.0
4. a) What is microsatellite? Write its principle. 3.0
b) Make a comparison between RFLP, RAPD and Microsatellite marker. 2.0
c) Which marker is best for genetic study of fish? Explain why. 3.0
5. a) What do you mean by genetic distance? What are the bases of genetic distance? 2.0
b) Explain the Nei's standard genetic distance method as a measure of genetic distance. 6.0
6. a) What do you mean by natural hybridization and gene introgression in fishes? 2.0
b) What are the factors promoting natural hybridization in fishes? 2.0
c) How will you detect hybridization in fishes? 4.0
7. Write short notes on *any Two (02)* of the followings: 4×2=8.0
 - i. eDNA and eDNA barcoding; ii. SDS-PAGE; and iii) Genetic drift

Chattogram Veterinary and Animal Sciences University

Faculty of Fisheries

Department of Fish Biology and Biotechnology

MS in Fish Biology and Biotechnology, January-June Semester Final Examination 2021

Course Code: FEN-501, Course Title: Fish Endocrinology

Total Marks: 40

Time: 2 hours

Answer any **FOUR** questions. Illustrate your answer wherever necessary. The figure in the right margin indicates full marks.

1. (a) Define endocrinology and endocrine system. 2.0
(b) How will you separate the endocrine gland from the exocrine gland? 2.0
(c) "Hormones are chemical messengers"- argues the statement. 2.0
(d) Make a comparative study on fish and the human endocrine system. 4.0
2. (a) How does hormone transport through the fish body? 1.0
(b) Make a list of the fish hormone with their specific functions. 4.0
(c) How do peptide hormones synthesize in the fish body? 3.0
(d) Differentiate between water-soluble and fat-soluble hormones. 2.0
3. (a) How does cell communicate with one another? 4.0
(b) Classify signaling molecules. 2.0
(c) Neurons are similar to a typical cell or not? - Explain your answer. 3.0
(d) Enlist the name of some neurotransmitters which are secreted in the fish body. 1.0
4. (a) What do you know about negative feedback? 2.0
(b) Which types of hormones use intracellular receptors and why? 2.0
(c) "Pituitary gland is known as the master gland" justify. 4.0
(d) Why Sertoli cell of the male reproductive system is known as a nurse cell? 2.0
5. (a) Which gland of fish is known as the third eye and why? 2.0
(b) What is meant by the heterocrine gland and why pancreas is called a heterocrine gland? 3.0
(c) How does hormone regulate the final testicular maturation in fish? 4.0
(d) Diagrammatically shows the endocrine control of vitellogenesis. 1.0
6. (a) How does hormone regulate the maturation of the fish oocyte in the ovary? 4.0
(b) "The HPG axis is a major signaling pathway that controls gonadal sex change in fish"- justifies the statement. 3.0
(c) Enlist the role of serotonin in fish. 2.0
(d) Write down the function of thyroid hormone in fish. 1.0

Chattogram Veterinary and Animal Sciences University

Faculty of Fisheries

Department of Fish Biology and Biotechnology

MS in Fish Biology and Biotechnology, January-June Semester Final Examination 2021

Course Code: **AFP-501**, Course Title: **Advanced Fish Physiology**

Total Marks: 40

Time: 2 hours

Answer any FIVE questions. Illustrate your answer wherever necessary. The figure in the right margin indicates full marks.

1. (a) "Temperature influences several other parameters and can alter the physical and chemical properties of water"- justify this. 2.0
(b) Do you think ration has any effect on fish growth? - explain your answer. 3.0
(c) What is T_{OPT} ? Briefly explain the relationship between growth rate and temperature. 3.0
2. (a) "Metabolism is the set of life-sustaining chemical reactions"- explain this. 2.0
(b) What is metabolic rate? Explain different types of metabolic rates. 3.0
(c) What do you mean by compensatory growth? 1.0
(d) Explain your thinking about energetic adaptation to temperature in fish. 2.0
3. (a) Briefly explain the physiological response to stress in fish. 3.0
(b) How do stress change blood parameters and hormone level? 3.0
(c) How will you prevent stress in fish? 2.0
4. (a) What are the components of the circulatory system? 2.0
(b) Explain blood as a transporting media of nutrients and gases. 2.0
(c) Explain the mechanism of blood circulation in fish. 4.0
5. (a) Enlist some characteristics of hemoglobin. 1.0
(b) Illustrate the gill ventilation mechanism with the steps. 4.0
(c) How do respiratory gases transport through blood? 3.0
6. (a) What are the stages of anesthesia and recovery? 3.0
(b) How do you prepare fish for anesthesia before starting sampling? 3.0
(c) Enlist some commonly used chemicals which are used in anesthesia. 2.0